REMARKS

By this amendment, claim 1 has been amended. Support for the instant amendments is provided throughout the as-filed specification. No new matter has been added. Accordingly, claims 1-16, 18-20, 22-27 and 29-41 are pending.

In view of the following comments, allowance of all the claims pending in the application is respectfully requested.

ALLOWABLE SUBJECT MATTER

As a preliminary matter, Applicant wishes to thank the Examiner for the indication of allowable subject matter in claims 34-36.

Applicant also notes that the claims 13-15, which had previously been indicated as allowable in the Office Action mailed February 11, 2009, have been subsequently rejected under 35 U.S.C. § 101.

REJECTION UNDER 35 U.S.C. § 101

Claims 1-16 and 18-20 were rejected under 35 U.S.C. §101 as allegedly directed to non-statutory subject matter. Applicant traverse this rejection.

The Office Action asserts:

> The claims are drawn to a method for determining at least one process parameter. A method for determining at least one process parameter is abstract instructions. Therefore, a method for determining at least one process parameter is not a physical thing nor a process as they are not "acts" being performed. As such, these claims are not directed to one of the statutory categories of invention (See MPEP 2106.01), but are directed to nonstatutory functional descriptive material.
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> [Office Action, page 3].

Claims 1-16 and 18-20 are drawn to a "method for determining at least one process parameter in a device manufacturing process." A process or method is one of the enumerated categories of invention which are patentable. *See* 35 U.S.C. § 101.

The Federal Circuit held that "[a] claimed process is surely patent-eligible under § 101 if: (1) it is tied to a particular machine or apparatus, or (2) it transforms a particular article into a different state or thing." *In re Bilski*, ___ F.3d ___, Slip Op. pg. 10 (Fed. Cir. October 30, 2008)(*en banc*) (citations omitted).

Applicant submits that the invention of claim 1 is tied to a particular machine or apparatus, and transforms a particular article into a different state or thing. As such, it is patent eligible under § 101 according to *Bilski*.

The Office Action appears to focus improperly on individual steps or limitations of the claimed invention rather than the claimed invention as a whole. "[E]ven though a fundamental principle itself is not patent-eligible, processes incorporating a fundamental principles may be patent-eligible. Thus, *it is irrelevant that any individual step or limitation of such processes by itself would be unpatentable under 35 U.S.C. § 101*." [*See* Bilski, page 18, emphasis added]. "[W]hen a claim containing a mathematical formula implements or applies that formula in a structure of process, which when considered as a while, is perfuming a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirement of § 101." [*See id.* page 15, footnote 12 citing *Diamond v. Diehr*, 450 U.S. 175, 192 (1981)].

First, applicant submits that the claims are directed to a particular apparatus. For example, claim 1 refers to "a calibration object" that has marker structure sets. That is a specific structure. Furthermore, though applicant submits that the existing structure is sufficient, claim 1 has been amended to further recite "adjusting a control parameter of a lithographic apparatus based on the unknown value of said at least one process parameter for said object in the device manufacturing process." [emphasis added],

additional structure rendering the claim directed to a particular apparatus, i.e., a lithographic apparatus.

Second, Applicant submits that the recited process is a transformation as that term has been interpreted by the Federal Circuit, and as defined in the Interim Examination Instructions for Evaluation Subject Matter Eligibility under 35 U.S.C. § 101 ("Interim Guidelines"). In particular, "transformation of electronic data has been found when the nature of the data has been changed such that it has a different function or is suitable for a different use." See, Interim Guidelines, p. 6. The Federal Circuit has found a transformation of electrocardiograph signals where signals representing a patient's heart function were transformed from analog form to a digital signal and processed in order to determine the presence or absence of particular high-frequency information, producing an output signal that, "is not an abstract number, but is a signal related to the patient's heart activity." See, *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*, 22 USPQ2d 1033, 1038.

In this regard, the recited spectral measurement data of claim 1 are not abstractions but rather are related to measurements of marker sets from a marker structure provided on an object. The spectral measurement data are manipulated such that they are suitable for a different use, to compare to calibration spectral measurement data to determine a process parameter. Likewise, the resulting process parameter is not an abstract number, but a parameter related to a process to be performed on the lithographic apparatus.

As such, Applicant submits that claim 1 is patentable under either prong of the machine or transformation test. Claims 2-16 depend from claim 1 and therefore, are also directed to patentable process.

* * *

For *at least* the foregoing reasons, the rejection of claims 1-16 and 18-20 under 35 U.S.C. § 101 should be withdrawn.

REJECTION UNDER 35 U.S.C. §§ 102-103

I. Claims 1-12, 16-19, 22-33, and 37-40 were rejected under 35 U.S.C. §102(e) as allegedly being anticipated by U.S. Patent Application Publication No. 2003/0048458 to Mieher *et al.* ("Mieher"); and

II. Claims 20 and 41 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Mieher in view of U.S. Patent No. 6,917,901 to Bowley, Jr. et al. ("Bowley").

Applicant respectfully traverses each of these rejections for *at least* the reasons that (i) these rejections have been withdrawn by the Pre-Appeal Conference Panel; and (ii) as previously pointed out, neither Mieher nor Bowley teach or otherwise render obvious the claimed invention.

I. These rejections have been withdrawn by the Pre-Appeal Conference Panel.

> The Office Action erroneously asserts:
>
> ***Applicant's arguments***, see pages 1-5, filed 6/11/09, with respect to the rejection(s) of claim(s) 1-12, 16-20, 22-33, 37, and 39-41 under Rejection – 35 USC 102(b) and 103(a) ***have been fully considered but are not persuasive.***
>
> [Office Action, page 2, emphasis added].

Applicant respectfully disagrees. Applicant filed a Pre-Appeal Conference Request on June 11, 2009, pointing out the legal and/or factual deficiencies of the appealed rejections. In response, a Pre-Appeal Conference was held and the panel participants agreed to:

> **Reopen Prosecution** – A conference has been held. ***The rejection is withdrawn*** and a new Office action will be mailed. No further action is required by applicant at this time.
>
> [Notice of Panel Decision from Pre-Appeal Brief Review, **emphasis in original**; ***emphasis added***].

Further, the Panel did not indicated that any issue(s) for appeal remain, nor that any of the claims remained rejected. [*See id.* box 2]. The Panel therefore, reversed the Examiner.

For the Examiner to now say that Applicant's arguments are not persuasive would vitiate and directly contravene the spirit of the Pre-Appeal Brief Conference program. For instance, the New Pre-Appeal Brief Conference Pilot Program, 1296 Off. Gaz. Pat. Office 67 (July 12, 2005) provides:

> This new program offers applicants an avenue to request that a panel of examiners formally review the legal and factual basis of the rejections in their application prior to the filing of an appeal brief. Effective immediately, the USPTO is offering applicants an optional procedure to review the examiner's rejection prior to the actual filing of an appeal brief. ***The program is intended to spare applicants the added time and expense of preparing an appeal brief if a panel review determines an application is not in condition for appeal.*** Although this procedure will not be appropriate in every appealed application, ***in the proper situations it can save both the resources of the applicant and the Office.***
>
> * * *
>
> This pilot program offers applicants an opportunity to request a review of identified matters on appeal employing an appeal conference currently employed in the Office, but prior to the filing of an appeal brief. ***The goals of the program are (1) to identify the presence or absence of clearly improper rejections based upon error(s) in facts, or (2) to identify the omission or presence of essential elements required to establish a prima facie rejection.***
>
> [Emphasis added].

To be sure, these rejections were considered by the Panel and the Panel found the Applicant's argument persuasive (i.e., that the rejections were improper). Requiring Applicant to once again address the *same* rejections which were withdrawn by the Panel necessitates additional resources on both the part of Applicant and the Patent Office.

In addition, to the extent that the Panel may have decided merely to issue the new ground of rejection under 35 U.S.C. § 101, in addition to the previous rejections on appeal, Applicant submits this procedure is improper. The " ... panel of examiners (including the examiner of record) ***will consider the merits of each ground of rejection for which appeal has been requested*** and will issue a written decision as to the status of the application." [*Id.*, emphasis added]. Thus, in considering Applicant's Pre-Appeal Brief, the Panel's should have considered only the grounds of rejections under appeal.

Indeed, "[t]he decision will not contain any additional grounds of rejection or any restatement of previously made rejections. ***Such matters will be addressed, as appropriate, in the Examiner's Answer."*** [*Id.*, emphasis added]. As such, if it was the Panel's sole recommendation for the Examiner to further issue the new rejection under § 101, without withdrawing the rejections under §§ 102-103, then the proper procedure would have been for the Examiner to have made the new grounds of rejection in the Examiner's Answer. [*See, e.g.*, 37 C.F.R. § 41.39(a)(2)("An examiner's answer may include a new ground of rejection.")].

Moreover, Applicant submits that this course of action clearly violates the Office's compact prosecution policy. "Under the principles of compact prosecution, ***each claim should be reviewed for compliance with every statutory requirement for patentability in the initial review of the application,*** even if one or more claims are found to be deficient with respect to some statutory requirement. ***Thus, USPTO***

personnel should state all reasons and bases for rejecting claims in the first Office action." [MPEP § 2106(II), emphasis added]. Reopening prosecution in response to a Pre-Appeal Brief Conference Request to further introduce a new grounds of rejection, at this juncture, is not timely nor was it necessary.

Accordingly, Applicant submits that it is improper for the Examiner to maintain these rejections because these rejections have been withdrawn by the Pre-Appeal Conference Panel.

Nonetheless, Applicant maintains the traversal of the rejections under §§ 102-103 based on Mieher, either taken alone or in combination with Bowley, for at least the reasons provided in the Pre-Appeal Conference Request filed June 11, 2009, and the Request for Reconsideration filed April 22, 2009, both of which are herein incorporated by reference. Indeed, neither Mieher nor Bowley teach or otherwise render obvious the claimed invention, as further discussed below.

II. Neither Mieher nor Bowley teach or otherwise render obvious the claimed invention.

A. Claims 1-12, 16-19, 22-33, and 37-40 are novel over Mieher.

Mieher teaches a model based on shape parameters, not regression analysis of calibration spectral measurement data.

Independent claims 1 and 22 each recite determining a mathematical model by using known values of at least one process parameter and by employing a multi-variant regression technique on the calibration spectral measurement data, the mathematical model comprising a number of regression coefficients. Applicant submits that the cited portions of Mieher fail to teach or disclose these features.

In particular, the Office Action relies upon paragraph [0080] of Mieher to allegedly teach employing a regression technique on the calibration spectral measurement data.

[See Office Action, pgs. 3-4]. However, the cited portions of Mieher do not describe using regression in the claimed manner. For example, Mieher discloses that ***"the scatterometry data (e.g., measured spectra) is interpreted into shape parameter information. This may be accomplished using iterative regression techniques*** and/or by library matching techniques such as those previously described, i.e., match the measured spectra with libraries that link profiles with spectra." [Mieher, ¶ 80, emphasis added]. Converting spectral information to shape parameter information is not the same as determining a mathematical model for determining unknown values of process parameters of an object in a device manufacturing process.

The Office Action, however, states: "shape parameter information of measurement spectra is an only type of spectral measurement data." [Office Action, page 2]. This interpretation is not consistent either with applicant's specification, nor that of the reference applied with regard to the terms "shape parameters" and "measured spectra."

For example, Mieher teaches:

> The shape parameters are generally associated with the shape of a structure disposed on a wafer (e.g., a target structure or some portions of a device structure). The structure may be in the form of a grating that is typically periodic. The grating may be periodic in one direction (X or Y), as for example a line space grating, or it may be periodic in two directions (X and Y), as for example a grid space grating. The shape parameters may include line width (width at a specific height), side wall angle, height, pitch, top-profile (degree of top rounding or T topping), bottom profile (footing) and the like. The shape parameters may also include 3 dimensional shape information of structures that are periodic in both X and Y directions (as in grid space gratings).
>
> [Mieher, ¶ 32, emphasis added].

On the other hand, with regard to measured spectra, Mieher discloses:

> The light emanating from the grating structure is typically scattered, reflected and/or diffracted at various orders, i.e., angles relative to the incident light. The characteristics of the

> scattered, reflected and/or diffracted light (e.g., intensity, phase, polarization, and the like) at the various orders is measured thereby forming a measurement signal or measured spectra.
>
> [Mieher, ¶ 44, emphasis added].

As such, Applicant submits that it is apparent from the express teachings of Mieher that the shape of the structure (i.e., shape information) and light scattered, reflected and/or diffracted from the structure (i.e., measured spectra) are neither the same nor equivalent to each other. Instead, Mieher teaches that the measured spectra may be used to "generally reveal information about the shape of the grating structure." [Mieher, ¶ 44, emphasis added].

Thus, contrary to the Office Action's contention, Applicant submits the cited portions of Mieher neither recognize nor consider the shape information to be the same as spectra information. Accordingly, the cited portions of Mieher fail to teach determining a mathematical model by using said known values of at least one process parameter and by employing a multi-variant regression technique on the calibration spectral measurement data, the mathematical model comprising a number of regression coefficients.

For *at least* the foregoing reasons, Applicant submits that claims 1 and 22 are not anticipated by the cited portions Mieher. Indeed, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Moreover, "unless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. § 102." *Net MoneyIN, Inc.* v. VeriSign, *Inc. et al.*, Slip Op. pg. 17-18 (Fed. Cir., October 20, 2008).

By contrast, Applicant's claimed invention specifically uses a mathematical model based on spectral measurement data, rather than shape parameters, for

subsequently comparing obtained spectral measurement data with calibration spectral measurement data. Indeed, Applicant specifically discloses problems with the conventional approach – like taught by Mieher[1] – for converting measurements into shape information:

> Scatterometry is conventionally used to determine the values of process parameters, like focus and dose. Generally, however, several assumptions are made regarding the relationship between process parameters and scatterometry measurement parameters. Examples of such assumed relationships are a linear relationship between focus and side wall angle (the slope at the side of a line-shaped structure) and a linear relationship between dose and mid-CD (the width of a line-shaped structure at half its height). In reality, there may be no unique relationship between one single scatterometry measurement parameter and a process parameter like focus or dose. There may be, for example, additional effects, besides focus, that contribute to the characteristics of a side wall angle. By the aforementioned assumption, these effects would then be abusively interpreted as focus.
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> [Applicant's Specification, ¶ 17].

A result of certain embodiments of Applicant's claimed invention is that no forehand knowledge of the optical properties of the materials may be required to determine the process parameters. [*See* Applicant's Specification, ¶ 56].

Therefore, for *at least* the foregoing reasons, Applicant submits that each and every feature of claim 1 has not been shown by the Office to be anticipated by Mieher. In particular, the Office Action has not shown how the cited portions of Mieher allegedly teach "comparing the obtained spectral measurement data with the calibration spectral measurement data to determine the unknown value of said at least one process

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[1] *See* Mieher, ¶ 43 ("The test data may be produced using a variety of techniques. In most cases, the test data is produced by measuring the printed structures with a measurement system and converting the measurements into shape parameter values. Any suitable measurement technique may be used so long as the measurements obtained are capable of being converted into shape information, i.e., the raw measured data is converted into shape data. By way of example, CD-SEM, scatterometry, atomic force microscopy, cross sectional SEM techniques and the like may be used."); ¶ 44 ("Scatterometry is a measurement technique that is capable of characterizing multiple shape parameters of a pattern.")

parameter for said object from said obtained spectral measurement data by employing said regression coefficients of said mathematical model."

Therefore, Applicant respectfully submits that a case of anticipation has not been established and that the cited portions of Mieher fail to disclose or teach each and every feature recited in claims 1 and 22. Claims 2-12, 16-19, 23-33 and 37-40 depend from claims 1 and 22, respectively, and are therefore, patentable for at least the same reasons provided above related to claims 1 and 22 and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claims 1-12, 16-19, 21-33 and 37-40 under 35 U.S.C. § 102(e) over Mieher should be withdrawn and the claims be allowed.

B. Claims 20 and 41 are non-obvious over Mieher and Bowley.

Further, Applicant submits that the cited portions of Bowley do not overcome the deficiencies of Mieher. The Office only relies upon Bowley to allegedly show a support structure configured to support a patterning structure and a substrate table configured to hold the substrate.

Therefore, Applicant respectfully submits that a *prima facie* case of obvious has not been established and that the cited portions of Mieher, Bowley, or a proper combination thereof, fail to disclose or otherwise render obvious each and every feature recited in claims 1 and 22. Claims 20 and 42 depend from claims 1 and 22, respectively, and are therefore, patentable for at least the same reasons provided above related to claims 1 and 22 and for the additional features recited therein. Thus, Applicant respectfully requests that the rejection of claims 20 and 41 under 35 U.S.C. § 103(a) over Mieher in view of Bowley should be withdrawn and the claims be allowed.

CONCLUSION

Having addressed each of the foregoing rejections, it is respectfully submitted that a full and complete response has been made to the outstanding Office Action and, as such, the application is in condition for allowance. Notice to that effect is respectfully requested.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

If an extension of time is necessary to prevent abandonment of this application, then such an extension of time is hereby petitioned for under 37 C.F.R. §1.136(a). Any fees required (including fees for net addition of claims) are hereby authorized to be charged to **Deposit Account No. 033975** (Ref. No. **081468-0356680**).

Date: **November 25, 2009**

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